Markivnokov's Rule

1) (i) Draw the structural formulae of the two organic molecules C and D, formed in the reaction of but-1-ene with steam. Molecule C undergoes a further reaction with PCl_3 or PCl_5 or $SOCl_2$ to form 2-chlorobutane.

(ii) Elaborate on the reaction occurring
In your answer you should include:
• identification of the major and minor products
• an explanation of why there are two possible products
• justification of your placement of the different structures in boxes C and D with reference to the reaction sequence.

2) Compare and contrast the reaction of HCl with but-1-ene, $CH2 = CH – CH2 – CH3$, and but-2-ene, $CH3 – CH = CH – CH3$.

Your answer must include:

• an explanation of the type of reaction occurring

• equations showing the structural formulae of all reactants and products

• a justification of why major and minor products form with one of these molecules, but not the other.

3) Discuss the reaction of HCl and Cl_2 with but-1-ene, $CH_3– CH_2– CH = CH_2$.

For each reaction you must include:

• an explanation of the type of reaction occurring

• structural formulae of all organic product(s) formed, including major and minor products, if any.